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Modeling of compact stars in embedding class one space time in general relativity

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It is well known that we can embed n dimensional manifold V_n in a pseudo-Euclidean space of m=n (n+1)/2 dimensions. However, m-n=n (n-1)/2 is the minimum extra dimension of the pseudo-Euclidean space-time which is called the embedding class of V_n. Last many years the embedding theorems have continued a topic of interest between theoretical physicists and mathematicians. We may connect the classical general theory of relativity to the higher-dimensional manifolds using this theory. Using this embedding theorem, we can explain the internal symmetry groups' characteristic of particles. In 1947, Karmarkar has found a constraint that the essential condition for embedding class one i.e. a spherically symmetric space-time of four dimensions embedded into a flat five dimensional space-time. In general, if we can embed n-dimensional Riemannian space-time into a flat space-time of dimension n+p. The Karmarkar has introduced a condition that relates to class one space-times. Later on, Pandey and Sharma have proved that the Karmarakar condition is only applicable for a necessary condition for a space-time to be of class one. The origin of the Karmarkar condition is chastely geometric in nature which provides a relationship between the two gravitational metric potentials. This relation is very important to obtain a whole explanation of the gravitational behavior of the stellar models. It is very exciting that the static spherically symmetric gravitational metric potential of embedding class one space-time is well-matched only with two type perfect fluid distributions, viz. (i) Schwarzchild's solution and (ii) Kohler and Chao solution. These gravitational metric potential is very useful to develop electromagnetic mass models under the Einstein-Maxwell background by taking a charged perfect fluid distribution. In general, whenever the charge vanishes in a charged fluid distribution, the following fluid distribution becomes the neutral counterpart of the charged fluid distribution. This neutral counterpart may fit to with either Schwarzschild interior solution or Kohler-Chao interior solution. However, not every charged fluid distribution needs to give its neutral counterpart always and subsequently if we set the charge, as zero then relating gravitational metric turns out to be flat and their matter density and pressure will become zero identically. This special type of charged fluid models provides an electromagnetic mass model.

Biography

Sunil Kumar Maurya has completed his PhD from Indian Institute of Technology Roorkee (IIT Roorkee). He is the Assistant Professor and Head at University of Nizwa, Oman. He has published more than 42 research papers in very reputed journals with high impact journal and has been serving as an Editorial Board Member of repute.

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